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USING A VIDEO MODELING-BASED INTERVENTION PACKAGE TO TEACH HAND WASHING TO CHILDREN WITH AUTISM

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THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Education in the
College of Education at the University of Kentucky

By

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Lexington, Kentucky

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ABSTRACT OF THESIS

USING A VIDEO MODELING-BASED INTERVENTION PACKAGE TO TEACH HAND WASHING TO CHILDREN WITH AUTISM

The purpose of this study was to teach four preschool children with autism spectrum disorder (ASD) to wash their hands independently using a video modeling-based intervention package. A research questions was asked: Is there a functional relation between a video modeling-based intervention package and increases in level and trend for washing hands independently? A multiple probe across participants design was used to answer this question. Results indicated that the intervention package had functional relation with the increase in level and trend of the three participants' performance in washing hands. The intervention package of video modeling and least-to-most prompting was found to be effective to teach the participants the skills taught.

KEYWORDS: video modeling, least-to-most prompting, hand washing, children with ASD, adaptive skills

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August 2nd, 2018

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The Importance of Hand Washing

Hand sanitization is a common practice in the United States as indicated by the Centers for Disease Control and Prevention (CDC, 2015). The CDC provides information on how germs get onto hands and make people sick, how to prevent illness and the spread of infection to others by proper hand washing, and how to remind people that the absence of hand washing can harm children around the world. Furthermore, hand washing helps battle the rise of antibiotic resistance. This information receives a positive response from many educational-based organizations who adopt the practice into their basic protocol (e.g., Kentucky Center for School Safety, 2017; NYC Department of Education, 2017). For this reason, having a hand-washing facility is mandatory since the students will perform this practice every day as part of their daily routines. The government also provides clear expectations about hand sanitation to those who handle food (Food and Drug Administration, 2017) and drugs (Code of Federal Regulation, 1980).

The school setting is also a common source of the spread of germs (Olson, 2015) as there are many students who come from different homes with different hygiene habits. Teaching children the basic skill of proper hand washing can reduce the risk of germ transmission, which will reduce the risk of infectious diseases (Borsari, 2003). A child who stays predominantly healthy during this critical development is likely to have better nutrition intake, more energy available for growth and development, and better school attendance (Humphrey, 2009). The U.S. Food and Drug Administration (2017) added that hand washing reduces the probability of a diarrheal outbreak by half, if caregivers

consistently apply the practice. Hand-washing regulations for child care in the United States indicate the importance of this practice to keep both staff and children healthy and safe. For instance, a child who is still in a diaper is required to wash their hands after a teacher or a caregiver assists with a diaper change (e.g., Kentucky standards of Practice Child-care Center Licensure, 2016; IN bureau of child care, 2013).

Children with ASD

According to The Center on the Social and Emotional Foundations for Early Learning at Vanderbilt University (n.d.), typically developing children by age 18 to 36 months can perform hand washing with little assistance, and when they reach 4 years of age, they should be able to wash their hands independently. Despite this independence, children may still fail to rub their hands with soap for the full 20 seconds recommended by the CDC (CDC, 2015).

While a 4 year-old child who is typically developing can perform hand washing at ease, it can be more challenging for a child with autism spectrum disorder (ASD). Autism spectrum disorder is characterized by deficits in social communication and social interaction as well as repetitive or restrictive patterns in behavior or interest (Diagnostic and Statistical Manual of Mental Disorders-5; American Psychiatric Association, 2013). Autism spectrum disorder is a spectrum disorder and the symptoms vary from mild to severe. Children with ASD can be a challenging population to teach because they typically exhibit motivational deficits (Shipley-Benamou, Lutzker & Taubman, 2002).

Video Modeling and Least-to-Most Prompting

Individuals with ASD are often considered visual learners (Schopler & Mesibov, 1995). According to the National Autism Center (2009) the use of visual strategies with students with autism spectrum disorder has been supported through research. These strategies are labeled established treatments in the field by the National Autism Center (2009), in the National Standards Report. This means that there have been a sufficient number of studies conducted that provide substantial evidence that visual strategies are able to produce beneficial results (National Autism Center, 2009).

There are several kinds of research-based visual learning strategies that can be used in intervention: scripting, video modeling, and activity schedules (Murdock & Hobbs, 2011). Video modeling is an instructional strategy where children learn the target behavior through watching and observing a video of a model performing the skill and then have an opportunity to imitate or practice it (Rosenberg, Schwartz & Davis, 2010). In other words, using video modeling means an individual views a video, rather than a live demonstration by adults or peers, and then imitates the behaviors displayed on the video (Delano, 2007; McCoy & Hermansen , 2007).

Charlop-Christy, Le, and Freeman (2000) found that video modeling resulted in faster acquisition of skills of completing tasks when compared to *in vivo* modeling in which the children observed the live model performing the target behavior. Moreover, video modeling is more cost effective. Video modeling can be indefinitely repeated as long as the video files still work, as opposed to hiring someone to be the model to perform the skill every day. Video modeling is an evidence-based intervention and has been effective at improving daily living skills, social skills, desired academic outcomes,

and decreasing inappropriate behaviors, such as tantrums and aggressive pushing (Banda, Matuszny, & Turkan, 2007; Akullian & Bellini, 2007).

Researchers have implemented this intervention to teach children daily living skills (e.g., Shipley-Benemou et al., 2002), communication skills (e.g., Charlop & Milstein, 1989; Sherer et al., 2001), play skills (e.g., Ulke-Kurkcuoglu, 2015; D'Ateno, Mangiapanello, & Taylor, 2003; Taylor, Levin, & Jasper, 1999), social interaction skills (e.g., Nikopoulos & Keenan, 2003) and perspective taking (e.g., Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003).

Studies about the use of video modeling for behavior interventions and skill development for children with ASD have been conducted. McCoy and Hermansen (2007) reviewed the literature on video-modeling and found that each of the studies they explored included at least one person with an ASD. Four types of video models were discussed in the literature review including: (a) adult modeling, in which a familiar or unfamiliar adult models the targeted behavior, (b) peer modeling in which a same aged, familiar or unfamiliar peer models the target behavior, (c) video self-modeling which refers to the behavior being modeled by the children themselves (often requires video editing), and (d) point-of-view modeling that involves the video displaying the behavior as if through the eyes of the person engaging in the behavior. Each of these model types has been effectively used to teach various target skills (e.g., communication skills, solitary play skills, social skills, generative spelling skills) to children with ASD (McCoy & Hermansen).

Additional studies provide evidence that video modeling is effective to teach those with ASD. For example, Akullian and Bellini (2007) conducted a meta-analysis of

23 single case research design studies using video modeling to teach individuals with ASD from ages 3 to 20 years old; those studies were conducted from 1980 to 2005. They noted that video modeling is an effective intervention for those with ASD. Their analysis also indicated this intervention encourages skill acquisition as well as maintenance and generalization of skills to other settings.

Delano (2007) discussed nineteen video modeling intervention studies for individuals with ASD from 1985 to 2005. The author found that seventeen studies used video modeling to teach social-communicative skills, whereas two studies were conducted to teach functional skills. Her findings produce inconclusive results as to whether video modeling is more or less effective as compared to other models for teaching individuals with ASD. However, she suggests that video modeling is highly appropriate for individuals with ASD (Delano, 2007).

On the other hand, a comprehensive review conducted by Brovelli (2017) found that from 18 studies involving video modeling to teach social skills to preschool children with ASD, only one study showed strong evidence as suggested by What Works Clearinghouse (WWC; Kratochwill et.al., 2014). The results of this literature review indicated that video modeling is not evidence-based for teaching young children with ASD social skills**.** However, it might still be an effective instructional approach to teach adaptive skills such as hand washing. It can be combined with another evidence-based practice such as the system of least prompts (SLP) or least-to-most prompting procedure (Collins, 2012). Systematic,-errorless instruction for students with significant disabilities often involves providing prompts that result in desired behavior, and then fading those

prompts until the students performs the behavior independently (Ault & Griffen, 2014). The video modeling procedure may accelerate the fading process of the prompts.

In another comprehensive review, Wong et al. (2014) emphasized the importance of treatments that provide scientific basis, such as the errorless-teaching model and video modeling for teaching several skills to individuals with ASD. Ulke-Kurkcuoglu (2015) found that both teaching methods, video modeling and least-to-most prompts, are effective for teaching pretend play skills to children with ASD. Another study conducted by Webb (2016) discovered that video modeling was more effective to teach telling time to children with ASD when it was paired with least-to-most prompting. The least-to-most prompting procedure starts with a presentation of the least restrictive prompt for an individual, and the type and intensity of the prompt are changed as needed, gradually moving to the most restrictive prompt. Transition between levels of prompt occurs when an individual does not respond during the prescribed response time. In the least-to-most prompting teaching model, for example, a prompting hierarchy which consists of at least three levels (e.g., no prompt, gestural prompt and physical prompt) should be created (Tekin-Iftar & Kircaali- Iftar, 2013, as cited in Ulke-Kurkcuoglu, 2015).

Rationale

In conclusion, research indicates that video modeling and least-to-most prompts can be effective ways to teach functional skills, including hand washing to children with ASD. Hand washing is an important daily living skill that can maintain one's well-being. Teaching young children with ASD to wash their hands independently using video modeling can potentially reduce the risk of health problems for children with ASD, who typically have gastrointestinal symptoms (Ibrahim et al., 2009). Ibrahim et al. (2009)

argued that there are case studies from patients referred to pediatric gastroenterology clinics that have suggested that children with ASD may have an increased prevalence of gastrointestinal symptoms, including constipation, chronic loose stools, abdominal pain, and gaseousness/bloating.

Research Question

The topic of this research study is the use of video modeling and least-to-most prompts as an intervention package to teach a desired behavior, specifically the functional skill of hand washing. The research question was: Is there a functional relation between a Video-Modeling-Based Intervention Package and increases in level and trend for independent washing-hands?

Chapter Two: Method

Participants

Children. Four Caucasian children, one girl and three boys, ages four to five years old participated in the study. The prerequisite skills required of the children for participation in the study were identified as being able to: (a) engage in an activity for at least 5 minutes, (b) have gross motor and imitation skill, (c) perform simple instructions, (d) attend to a video on the iPad/laptop screen for at least 2 minutes, and (e) have gross and fine motor skills adequate for performing the steps during the task analysis of hand-washing skills targeted for teaching. The responses of the children were observed in both planned and incidental activities to assess their prerequisites skills within the context of determining whether they had the prerequisite skills or not to continue to the group intervention. The result of the observation showed that the children had the necessary prerequisite skills to participate in the study.

The study was conducted by the author by screening the participants who were having difficulties in washing their hands. The difficulties encountered by the participants were that they constantly failed to perform the important parts of hand washing (e.g., applying some soap and rubbing the hands together) and taking too long or not long enough to perform the steps of hand washing. Both accuracy and independence of performance were taken into account. In addition, the study also prioritized children with ASD, or being referred for an assessment for ASD to be included to the intervention.

Three of the participants had been diagnosed with ASD and the other one would be assessed for ASD because he displays social communication deficits such as avoiding eye contact, having trouble expressing needs and emotions as well as relating to others,

and having speech delays. They all attended a public preschool in Lexington, Kentucky, where they spent five days each week in the same classroom from 8 a.m. to 4 p.m. There are 18 students in the inclusive classroom.

Parental permission was received for participation of the children in the study as well as for the access to their Individual Education Program (IEP). Aliases were given to the children to protect confidentiality and maintain anonymity.

Bob is a three-year and nine-month-old Caucasian boy who had developmental delay and had been referred for an ASD screening because he displayed social communication deficits such as avoiding eye contact, having trouble expressing needs and emotions as well as relating to others and having speech delays. He received special educational services and met with a speech therapist twice a week in the program. Bob's IEP goals were social and adaptive skills. Bob used one- to two-word utterances to communicate with adults but these tended to be repetitive and self-directed, not in response to others. When he used his words to communicate with peers, they found it difficult to understand him.

Bob's overall adaptive score on the BDI-2 (Battelle Developmental Inventory, second edition), with a standard score of 78, is below average range for his age. He could use utensils about 60% of the time during meals, fed him-self finger foods, and drank from an open cup. Bob participated with dressing activities and needed assistance with clothing fasteners (zippers, buttons, and snaps). He started to have toilet training at school, which often results in screams or cries when a teacher asks him to stop whatever he is doing and to go to the toilet. He sometimes kept crying and yelling "I can't do it!"

when the teacher asked him to sit on the toilet even though he actually could do it. He immediately stopped crying when he heard the sound of his pee. He assisted with self-care tasks (washing hands, wiping face/nose). Bob could move around his environment and occupied himself during play. He needed cues to help clean up toys. His mother reported that Bob understood that hot items are dangerous. She also reported Bob stayed with her when in public and did not try to run away. She reported concerns that Bob was a risk taker and that he sometimes jumped off the stairs during play at home and liked to seek movement activities. She reported Bob could transition between at-home activities as he knew what to expect. He was having difficulty with transitions at daycare, but improving. Bob also had difficulty participating during Circle Time Activities as he sometimes tried to leave the group, got toys off a shelf, and did not always pay attention. He was also given a fidget toy during Circle. Bob shows an interest in books, but has difficulty listening to a story. The head teacher reported Bob tended to move quickly from one classroom center to another and took materials to other areas of the room and not always played with them, leaving them only to move to another toy.

Bob's overall Personal-Social score, with a standard score of 72, was in the below average range of his age. He demonstrated ability to express likes and dislikes as well as enjoyment or preference to certain activities or situations. He also responded positively to praise and will show affection toward familiar people. He had difficulty following multi-step directions and the class routines. Bob was able to play independently in the company of peers and engage in parallel play. However, the head teacher said that Bob used to engage in rough play with others and not realize his own strength or boundaries. She also mentioned that Bob was rough with toys and would bang toys or crash cars with force.

Bob was also reported to exhibit some aggressive behaviors towards peers such as knocking down a friend's blocks, pushing, or biting. The teachers applied intervention to him to decrease these behaviors. They use visual supports, so that every time he hit or bit, they immediately took him over the poster on the wall and verbally explained it to him. Bob demonstrated skill development that was below his same age peers and this might adversely impact his ability to interact positively and productively with peers and adults, advocated for wants and needs, attended and complied with individual and whole group direction, and cooperatively participated in group lessons or activities in the preschool classroom.

Bob often became upset when told to wash his hands, especially if it was not the part of his classroom routine (e.g. after he picks or blows his nose). He usually cried and screamed to show his objection. Fortunately, he was easily soothed soon after the hand washing, which was done by hand over hand prompting. Distracting his attention to something else usually works. Bob liked to run to one of the teachers whenever he gets upset. One of the teaching assistants could calm him down most of the time.

Bob's favorite reinforcer is an iPad. He chose this reinforcer most of the time as a reward of completing the task boxes assigned by the head teacher. He worked one on one to finish his task boxes. The teacher handed him the iPad soon after he finished the tasks. He had 10 minutes to watch videos or play games on the iPad. Unfortunately, he often cried when the timer went off because he did not want to stop playing with the iPad. As the school year was almost over, Bob showed some progress in using his words and labeling items. He demonstrated ability to express his emotion, showed enthusiasm for play, and followed directions related to his routine with prompts.

Bob received Special Education Services daily from an Interdisciplinary Early Childhood Educator (IECE) at general education classroom and Speech/Language Therapy services 7 times per month from a Speech Therapist.

The second participant was Kim; she was a four-year and five-month old. She had been diagnosed for having an ASD as her primary disability. She met DSM-5 diagnostic criteria for a diagnosis of high functioning Autism Spectrum Disorder (ASD). In addition, she was also assessed using the Assessment, Evaluation, and Programming System (AESP) in January 2018. Kim's score in the area of adaptive skills were 77%, which had improved since her 60% score in October 2017.

Kim was assessed using the Adaptive Behavior Assessment System-3 (ABAS-3). The general adaptive composite score fell in the below average range when compared to the same age typical peers. Kim was potty trained, and could independently use the bathroom. However, she often became upset if someone was in the bathroom with her or too close to her when it was her turn to go. She usually yelled, pushed, spitted, hit, or kicked peers who attempted to go into the bathroom at the same time as her. Kim was able to wash her hands, but the teachers noted that she took an exceptionally long time to do so. She laughed, growled, made faces or screamed at herself in the mirror or others around her, and waited for long periods at the sink before hand washing. If another peer approached the sink while she was washing her hands, she would become upset and yell "It's my turn!" or "Go away!"

In the beginning of the 2017-2018 school years, Kim was unable to eat meals while in close proximity to other peers without lashing out to hit, kick or spit at them. A

table was provided for her so that she could have her own space. In the middle of the school year due to the decrease in aggressive behaviors, Kim's table was moved to the side of the main table during meals so that she can be part of the class and communicate with peers. In January 2018, she no longer needed the separate table attached to the main table, and now ate alongside everyone else. Occasionally, Kim still kicked, hit or spitted at the peers near her, and the teacher would temporarily remove her from the large table. She became very upset at the teachers when this happens, and yells "Stop this!", "I don't need your help!", or "I hate/don't like you", "I want to go home!", and/or "I want my mommy!"

Kim was able to sit at Circle and listen to a story. She enjoyed being read to, loved to answer questions about the book, or be called to share something interesting to the class. However, if Kim saw other children raising their hand at the same time as her, she immediately started screaming or crying, or sometimes growling/grunting. She would scream the peer's name, told them to put their hands down, or yelled saying "I want my turn!", "It's my turn!", or "I'm being quite! Call on me!" Kim needed several prompts to take a deep breath, wait her turn, or stop crying/screaming. Occasionally, she would be so upset that she would take a break by going for a walk, or sitting in the classroom library or "quite cube", a wooden box fits up to two children where a child usually spent her/his time calming down her/himself or just wants to be alone. And/or reading to her/himself.

Kim flourished in the small group setting. The teacher worked with her one-on-one each day, and Kim was aware of that. A teacher sat with her at her designated space and reviews her social stories every morning. Kim required social narratives about staying calm while at school, being nice to friends and teachers, and having a good

day/feeling happy. She became upset or frustrated if teacher was not readily available to work with her (due to unforeseen incidents) as soon as she was ready. Often times, while she was angry, she would fall herself to the floor and often accidentally bumped her head on the table, or rolled her body into piece of furniture. She began yelling at animate object and calling it a "bad table", or saying "It hurts me!". She almost always needed tight pressure hugs during this time to calm down. Sometimes she could calm down by taking deep breaths.

Her parents reported seeing this behavior at home as well. Once, Kim tripped on a log while hiking and accidentally scraped her leg. Kim then attempted to "attack" and almost bit the log before her dad intervened.

Because of her behavior, Kim had difficulties following through 2 to 3-steps direction that was routine and/or non-routine based. She needed several (verbal, visual and physical) prompts to follow a direction, especially during transitions. Kim received Special Education services from IECE Educator and Special Ed Teacher every day. She also received Speech/Language Therapies 6 times per month from a Speech Therapist at regular preschool classroom and twice a week at resource room. In addition, she attended Occupational Therapy twice per month given by an OT.

Sam was the third participant. He was 5-year and 8-month old. He was medically diagnosed for having ASD using DSM-5 assessment tool. In his recent IEP, however, this diagnose was no longer mentioned. His primary disability was developmental delay. Sam's articulation and language skills were evaluated using the Goldman Fristoe Test of Articulation-3 (GFTA-3) where he received a standard score of 72 which indicated his

articulation skills were moderately delayed and below that similar aged peer. He received a core language standard score of 83 with a percentile of 13 on the Clinical Evaluation of Language Fundamentals Preschool-2 (CELF-P2). His receptive language standard score was 79 with percentile rank of 8 and his expressive language standard score was 73 with a percentile rank of 4 indicating his receptive and expressive language skills were mildly to moderately delay.

Sam was evaluated by an occupational therapist in March 2018 in his preschool classroom. On a couple of occasions, usually when he was asked to participate in non-preferred tasks or non-routine transitions, he became upset and whined or raised his voice as a form of communicating. With reminders from staff to "use his words" to explain why he was upset, he was able to quickly regroup and follow instructions.

Sam was assessed using the Peabody Developmental Motor Scales-2nd Edition (PMDS-2). During testing, he was noted to utilize his left hand to color, draw, and write with a modified 3 finger tripod grasp and a static tripod grasp. He was observed to bring his hands together at the midline, cross midline, transfer objects from one hand to another, and use both hands in a stabilized/assisted pattern. Based on the skills observed during the evaluation and the score obtained from the PDMS-2, Sam is demonstrating average fine motor skills in the areas of grasping and visual-motor integration.

In the area of gross motor, Sam obtained a scale of 5 which is within the below average range. He walked down stairs without assistance, while alternating his feet. He imitated the bilateral movements of an adult, bended over and touched the floor with both hands, caught an 8-inch ball from 5 feet away using both hands. Deficits in the area of

fine and gross motor impacted Sam's ability to complete fine motor tasks such as writing his name/letters of the alphabet, and completed gross motor tasks such as hopping forward on one foot without support, or standing on each foot alternately with his eyes closed.

The Behavior Assessment for Children-Third Edition (BASC-3)-Preschool rating scale was completed by Sam's mother and teacher to provide analysis of behavior. The Behavioral Symptoms Index included all of scales in the externalizing index as well as the additional ones and provided a measure of overall level of problem behavior. Based on responses from the parent, Sam's overall behavior was in the clinically significant range (Tscore=76). Based on the teacher ratings, his behavior was in the clinically at-risk range (Tscore=63).

The Externalizing Problems Composite provides a measure of disruptive behavior problem such as aggression and hyperactivity. These overall behaviors were reported to be in the typical range at school (Tscore=58) but in the clinically significant range at home (Tscore=78). At home Sam was reported as often being restless and overactive; his mother's rating indicated clinically significant level of hyperactivity. At-risk levels of aggression were reported at school, but clinically significant levels at home.

The Battelle Developmental Inventory-2nd Edition (BDI-2) was used to assess Sam's current level of functioning. Sam, overall, obtained a developmental Quotient of 67 for the Personal-Social Domain. This score was within the low average range of functioning and at the 1st percentile. Sam initiated interaction with familiar adults, used adults other than parents as resources, and recognized adults' feelings. Sam did not

always respond positively to adult's praise or show appropriate affection toward people, pets, or possessions. He sometimes enjoyed having simple stories read to him, separated easily from parents, and asked for help when needed, followed direction without resistance and waited his turn for teacher attention. He did not attempt to be humorous. For this subdomain, Sam's skills were rated to be well below average with scaled score of 2.

Sam was able to dress and undress himself without supervision; however, his mother noted that getting him ready in general could be a very long process so she often dressed him herself for the sake of time. Sam took care of his own toileting needs, but when it was time to wash his hands, he often just wet his hands and wiped them off right away.

Sam received special education services from IECE Educator and Special Education Teacher once a day, Speech/Language Therapies from Speech Therapist six times a month at regular classroom and once a week at resource room. He also received Occupational Therapy once a month from an OT.

John was the fourth participant in this study. He was five years old. He currently received special education services under the eligibility category of ASD for he was diagnosed with Autism Spectrum Disorder by Cincinnati Children's Hospital when he was two years old. John participated in school based skilled occupational therapy to support his development of process skills (e.g., attention, task initiation, termination of activity, etc.), social skills, and sensory processing for age appropriate academic readiness.

John presented as a happy child that enjoyed his preschool setting. He was often observed seeking for movement opportunities during classroom activities. He liked to build with interlocking cubes and made his creation spin on the floor. With occasional minimal cues for body awareness, John was able to sit on his designated carpet square throughout Circle time, usually holding a fidget. He benefited from cues from the teacher to use his words such as "I want…" or "I don't want…" as he would sometimes push away a peer or an adult as his way to communicate his unwillingness to engage in the play or activity. He had been observed to be easily distracted by visual and auditory inputs in his environment. He benefited from structured routines, used of visual schedule, social stories, warning prior to transitions and timers to support transitions within his school day. He might decline non-preferred task, but would participate with encouragement, token reward system, and increased time. John's process skills, social skills, and sensory processing skills continued to negatively impact his participation in the academic setting.

John was assessed using the Sensory Processing Measure-Preschool, Home Form in May 2016 and scored within the definite dysfunction range in all areas on the assessment including social, participation, vision, hearing, touch, body awareness, balance and motion and planning and ideas. His mother reported that he currently received private occupational therapy services to address sensory needs. In the area of vision, John was easily distracted and had difficulty attending to activities. He was also easily distracted by auditory stimuli such as toilet flushing, yelling, loud television or loud environment in general. In the classroom, John typically covered his ears when it was too loud, or screamed louder than the rest of his peers.

The Adaptive Domain of BDI-2 was completed with John through observation and interview in May 2016. John's overall adaptive score, with a standard score of 64, was in the well below average range for his age. The Self-Care subdomain measures a child's ability to perform tasks to perform daily routines with increasing independence. John removed his shoes and socks and participated with dressing activities. He needed assistance with clothing fasteners (e.g. zippers, buttons, and snaps). He assisted with self-care tasks (wiped nose/face, washed hands).

For the majority of the day, the prospective participants did not consistently display functional self-care skills, such as hand washing and using the bathroom independently. In fact, one of the participants consistently needed physical prompting to wash his hands. The intervention chosen to improve the display of hand washing independently was a form of modeling called "video-modeling" and least-to-most prompts

Adults. There were a total of seven adults working in the classroom; three teachers who worked daily, one speech therapist who came twice a week, one occupational therapist who also worked two days a week and two student workers who worked for about eight to twelve hours per week. The author was one of the student workers and worked for nine hours a week.

The author trained a teaching assistant, Vanessa, who was a student of a master's degree program in Interdisciplinary Early Childhood Education to take inter-observer reliability data and procedural reliability data. It was her last year in this program; she graduated in the spring semester, the same time the study was conducted. She and the author practiced taking inter-observer reliability data on three children in the classroom

other than the four targeted participants. The author and the rater stopped practicing the data collection when the agreement reached 100%. There was another rater taking the inter-observer agreement and procedural reliability data other the teaching assistant mentioned previously. A doctoral program student, Becky, was trained with the same procedures for the same purpose in case Vanessa could not take the inter-observer data and procedural fidelity due to the classroom's tight schedule.

The author selected two familiar adults from the classroom to be the model of the videos and perform the task of washing hands. The head teacher was chosen because Bob and Kim were more compliant to her. Bob was often observed to seek for help from the head teacher when he had difficulties completing a task. He also listened to the head teacher's words more when he had tantrums. On the other hand, Kim was easier to be soothed by the head teacher when she was experiencing discomfort because of sadness or anger she sometimes felt. Vanessa was the second model in the video modeling. She was selected because Sam and John were often observed to play with her during free-play time. Sam and John loved to play with blocks and Lego to build something, and they would proudly show their creation to Vanessa. The objective of selecting the models based on the participants' preference was as an attention getter to keep the participants focus on watching the video.

Setting and Materials

Setting. The study took place in a public preschool classroom, between the hours of 7:45 AM and 11:30 AM where the four participants attended the preschool program during the week. There were 18 children in this inclusive classroom, with 12 boys and six girls. The classroom's population was diverse including different ethnicities, cultures,

languages, abilities and socio-economic statuses. Three teachers worked daily with the students in addition to two student workers who came two to three times a week. A speech therapist and an occupational therapist also worked in the classroom twice a week.

There were three sinks in the classroom, but only one of them was used for the training. The sink used had a manual water tap and was the perfect height for young children. Each sink's size was 22 by 33 inches. The height of the cabinet where the sink was installed was about 20 inches. The area around the sink was about 35 square feet, which provides enough room for the author to help the child with hand over hand prompting if needed.

Materials. The study involved the use of video modeling and least-to-most prompts to teach the four children to wash their hands independently by following the steps of hand washing showed in the video. The videos where two different models performed the target skills of hand washing were recorded using an iPad Pro (10.5-inch). The iPad has a 12 megapixel camera which can produce high quality pictures and sounds for a video. The capacity of the iPad was 256 GB with 4 GB RAM. The iPad had a rubber case to keep it safe from the possibility of destructive behavior (e.g., children throwing it).

The intervention package consisted of one or two short clips from YouTube Kid as attention-getters, and an individualized-teacher-made video model of the target skills. Each child was allowed to choose any short clips from the YouTube Kid for the maximum duration of 5 minutes to avoid satiation. Each child had different account created under their names on the application. All four children could recognize their names and accessed the right account at each intervention session. A different video of

the target skills was made for each child and was stored in a Google-Drive account. The difference was only in the beginning of the video where the teacher in the video personally greets the participant by mentioning their names. Google Drive and YouTube Kid channel were chosen because they can be accessed from any device as long as there was an internet connection. The head teacher performed two videos of hand washing for Sam and Kim because they were more compliant with her. Bob and John had video modeled by one of the teaching assistants whom they usually like to play with.

The teacher on the video started the chained tasks by personally addressing the target child's name and then continued carrying out the steps of hand washing. Each step was presented with a verbal prompt. The teacher counted to 20 to complete the suggested 20 seconds length of hand washing (CDC, 2015). She ended the video by saying "Okay…It's now your turn to wash your hands!"

There were four different files of video model stored on Google drive to make it easy to pull up the files on any devices. An account on Google drive was created for the intervention and enabled the children to find their files with ease.

For the purpose of this study, the author also investigated different kinds of soap dispensers on the market. She found a soap dispenser that required less effort to press so that the children could perform the step of getting some soap without any help. The teachers on the video used the soap from the soap dispenser provided by the author. The same soap container was placed on the sink where the children could easily reach it. However, the children were free to choose the soap they wanted to use.

Dependent Variable

Hand washing was broken down into nine steps. The steps were as follows: turns the water tap on, wets the hands, puts soap on hands from soap dispenser, rubs soap on hands for 20 seconds indicated by the author counted until 20, rinses soap out, turns the water tap off, takes the paper towel, wipes hands dry, and throws the paper towel into the trash bin. The detailed definition of each step can be found in Appendix A. The instructional objective for each participant was set as follow: When it is time for the four participants to wash their hands, they will perform each step correctly and independently at 100% accuracy for at least three consecutive sessions. Each participant should be able to maintain each step of the target skills independently by the end of the study.

Independent Variable

The implementation of video modeling by a familiar adult performing the task analysis of hand washing and least-to-most prompts to teach four children with ASD to wash their hands independently is the independent variable of this study. The video model involves the child observing a video of a model engaging in the target behavior and the child immediately imitating the action when the video is over. In addition to the video model, the least-to-most-prompt technique was applied, starting with no prompt, verbal prompt and physical prompt.

Data Collection

The author recorded the data for probe, intervention and maintenance sessions by observing the participant's behavior as she conducted the study. Behavior can be measured in real time by observing a person's actions and recording responses of interest as they occur (Cooper, Heron, & Heward, 2014). The data were measured by calculating

correct and incorrect rate of response since the author was assessing skill development (Cooper et al., 2014). Cooper et al. (2014) suggest that correct and incorrect rate measures together provide important information to help a teacher evaluate how well a student is progressing. The way the data were collected enables the teacher to indicate the target skills that the students still need to work on.

The teaching assistant, Vanessa or Becky, collected inter-observer agreement at least 25% of probe and intervention sessions and at least 50% of maintenance sessions. Procedural fidelity data were taken at the same time as the inter-observer-agreement data.

The data were recorded using a task analysis data sheet found in Appendix B. The plus (+) sign was given for the occurrence of the target behavior whereas a minus (-) sign was added for the non-occurrence. However, the author and the independent observer also recorded any prompts needed for the steps completed. Only the total number of occurrences without any prompts was divided by the total number of opportunities and multiplied by 100 to get the percentage of independent correct responses.

Procedures

Probe. The author watched the participants perform hand washing in their typically daily routines (e.g., at arrival, before snack and lunch, after using the bathroom). The teachers reminded the children to wash their hand, particularly those who did not want to perform the tasks and told them that it is not an option to skip washing their hands. No feedback was provided during baseline. The author simply checked the occurrence and non-occurrence of the target behaviors by adding a plus (+) sign for any step the child performs correctly and independently or a minus (-) sign for any step on which the child did not perform or did not perform accurately. There were at least three

opportunities to collect the data in one day: in the morning upon arrival, after playing at the playground and after a large group activity right before lunch. The author used two of these opportunities to take the probe data on the participants. For the steps of the probe phase, see Appendix B.

Video Modeling and the Least-to-Most Prompting. The intervention package consisted of video modeling and least-to-most prompting. The author introduced the first participant to the intervention after a minimum of five probe data points were collected and/or until the data were stable. Prior to the intervention, the four participants were introduced to the features of the iPad. The researcher made them familiar with the iPad's display that consists of two main buttons: YouTube Kid and Google Drive. Four accounts were created on the YouTube Kid. Each account was named after the participant; therefore they had their video preferences saved. Similar to the YouTube Kid accounts, the videos of the targeted skills were also saved in Google Drive in four different names.

Once the participants had the iPad on their lap or on a table, the author offered to let them to watch short clips for maximum 5 minutes. All participants showed interest in watching short clips from YouTube Kid, except John. He constantly refused to access YouTube Kids when the author offered him to do so. The author responded to any comment coming from the participants when they watched any short clips from YouTube Kid. Bob likes to watch clips from "Educar Toy School", EduBuzz Kids and Bibo Toys channels. Kim likes to watch Tayo School channel, especially those about spiders and bugs. Sam enjoys watching magnetic games channel where he often commented on the construction they built in the clips. A modification was created for John because he

constantly skipped the step of watching the clips from YouTube Kid which also eliminated some steps contingent on this step.

After each of the participants finished watching the clips, the author prompted them to click a video of washing hand procedures saved in Google Drive. She kept all participants focused on the video of hand washing by verbally reminding them when they seemed to get distracted (e.g., "Watch Miss Cayla, she is now rubbing her hands together!). As soon as the video ended the researcher prompted the child to initiate hand washing by saying "Now, it's your turn to wash your hands! Let's have clean hands like Ms. Cayla's!" After watching the video, the author and the participant went back to the classroom and walked to the sink to perform the activities. The researcher started counting until five as soon as the participant stood near the sink. If the child did not initiate the task, the author verbally prompted them to start washing their hands by saying "Are you ready? Now, turn on the water tap!" There was 5-seconds-waiting-period for each step. If the participant stopped at any step of the task for more than 5 seconds and needed a prompt to continue, the step that needed a prompt would be considered as a nonoccurrence and the prompt needed on that step was recoded. The prompt hierarchy included: no prompt, verbal prompt and physical prompt.

Since each participant could not count to 20, the author decided to help them count the number to 20 when they were rubbing their hands together with a small amount of soap. The waiting period for this particular step was another 5 seconds after the 20 second process of rubbing both hands with soap. A descriptive verbal praise (e.g., "Good Job Bob! You rubbed your hands for twenty seconds!") a high five and/or a hug was delivered when the child showed progress on at least one step in the chain, otherwise the

author thanked the child for trying to perform the task by saying "Thank you for trying John!" See Appendix D for detail procedures.

The intervention began with Bob as the first tier. Meanwhile, intermittent probe data were taken on Kim's, Sam's and John's performances of the targeted skills. The subsequent tier began after Bob showed a 22% increase in the number of steps of hand washing accurately performed compared with the probe session. Therefore, the intervention was introduced to the second tier when Bob reached 88% accuracy. However, the criterion of mastery set for Bob was 100% accuracy of the target skills. When Kim was receiving the intervention, Bob continued the intervention session until he met his criterion of mastery at 100% accuracy or until he spent at least seven consecutive intervention sessions. The author started the intervention for Sam as the third tier when Kim showed 22% progress compared with the probe session data which yielded 100% accuracy. The author ended the intervention for Kim when she showed stable data of 100% accuracy on the target skills for seven consecutive sessions. The first and second tiers continued to the maintenance session when Sam performed the intervention session. When Sam reached 22% progress and showed stable data for three consecutive sessions, John started to receive the intervention. Both Sam's and John's criterion of mastery was set at 100% accuracy.

Maintenance. When a participant reached the level of criterion and/or showed stable data, they entered maintenance sessions two to three days after the intervention session ended. All four participants had two maintenance data sessions, except John who was the last tier. The maintenance datum for John was taken on the last day of the school year.

The procedure for the maintenance session resembled with the probe session except for one minor change to one of the steps of hand washing. When the child rubbed their hands together after applying some soap, the author or the teacher was allowed to help them to count until 20. See Appendix E for the details.

Inter-observer agreement

The author had two independent observers monitor and collect data on the participants' steps of hand washing. The independent observers or the raters worked as teaching assistants at a university-based preschool classroom. They were trained and equipped to collect the data using the data sheets until they met 100% agreement before actually conducting the intervention. The table of the target behavior definition and the task analysis can be found in Appendix A. The inter-observer data were collected from each participant for probe, intervention and maintenance sessions. Inter-observer data were collected on 25% of probe sessions, a minimum of 25% of intervention sessions, and at least 50% of the maintenance sessions.

The percentage of inter-observer data was calculated by counting the total agreement and divided it by total agreements plus total disagreement and then multiplied it by 100. The inter-observer data sheet can be found in Appendix G.

Procedural Fidelity

The data for procedural fidelity and the data of the inter-observer agreement were taken by the teaching assistant at the same time. The author explained the steps of the intervention package and provided the checklist sheets. The data was collected in 25% of the total probe and total intervention sessions of each participant, and 50% of maintenance session. The procedural fidelity data sheets are available on Appendix E for

the probe session, Appendix D for the intervention session, and Appendix F for the maintenance session.

Experimental Design

A single case multiple probe across participants research design (Gast & Ledford, 2014) was used to examine the effects of video modeling and least-to-most prompts on teaching children with ASD to wash their hands independently. Each child participated in all three phases of this design. The three phases included probe, intervention, and maintenance sessions.

To demonstrate experimental control, the probe data in all tiers should first show acceptable stability in level and trend before introducing the intervention to the first tier. Upon introduction of the independent variable to the first tier, there should be an immediate and ideally abrupt change in the dependent variable in a therapeutic direction in this tier, while data in other tiers remain stable and unchanged (Gast & Ledford, 2014).

The author observed two indicators within each tier to determine whether or not the intervention worked. First, after watching the video modeling of washing hands, the author observed the accuracy of hand-washing steps performed by the participants. The task analysis for the skills of hand washing was broken down into nine steps that can be found in Appendix A. Second, the researcher took notes on whether or not each step of hand washing was performed independently without any prompting.

During probe sessions there were no specific consequences to the children contingent on their performance. There were two sessions conducted each day to collect probe data. The researcher spent total three school days to collect the probe data before the first tier received intervention. The child spent approximately 11 minutes in the

intervention session: 2 to 5 minutes to watch a short clip, 3 minutes to watch video modeling, and another 3 minutes to perform the task of hand washing.

During the maintenance sessions, both the intervention package of video modeling and least-to-most prompting were withdrawn. The procedures resembled the probe session except for one minor step of watching the participant performing the hand washing. When the participant asked for help in counting to 20 on the rubbing-hands step, the author helped them. Bob and Sam consistently required extra help on this step.

Since the introduction of intervention was staggered, the author was aware of the potential for covariation. Observational learning could happen if the other participants watched their peer received the intervention in the same classroom, using the same sink. Therefore the author secured a different room for the steps of watching the video.

Reliability

Dependent variable reliability. Dependent variable reliability data were collected during at least 25% of all sessions per experimental condition. Inter-observer agreement data was calculated using the point-by-point method by taking the total number of agreements divided by the sum of the agreements and disagreements and multiplying it by 100 (Gast & Ledford 2014). The overall mean of interobserver agreement was 96% with a range from 88% to 100%. The mean interobserver agreement for Bob was 97% with a range from 88% to 100%, Kim was 92% with a range from 88% to 100%, Sam was 98% with a range from 88% to 100%, and John was 97% with a range from 88% to 100%.

Independent variable reliability. Independent variable reliability data were collected during at least 25% of probe and intervention sessions, and at least 50% of

maintenance session. The data indicated the accuracy of implementing the planned author's behaviors also known as procedural fidelity. Procedural fidelity was calculated by adding the number of procedure steps the author completed, divided by the planned number of procedural steps and then multiplying it by 100 (Gast & Ledford, 2014). The overall mean of procedural fidelity was 98% with a range from 80% to 100%. The mean of procedural fidelity for Bob was 98% with a range from 94% to 100%. The mean procedural fidelity for Kim was 95% with a range from 80% to 100%, for Sam was 99% with a range from 98% to 100%, and the procedural fidelity for John yielded a score of 100%. A procedural modification was created for John because he consistently refused to watch clips from YouTube Kid which also eliminate some steps contingent on this step.

Chapter Three: Results

Bob. **T**he data for all three phases for Bob can be seen in tier 1 of Figure 1. During the probe session, Bob performed the task of hand washing at a mean 56% accuracy with a range of 33% to 66%. After six stable probe points were collected, intervention was implemented. Bob's criterion was set 100% as his criterion of mastery. Bob spent nine intervention sessions; unfortunately he did not reach his criterion of mastery. On the first and the second day of intervention, Bob refused to be prompted. Started from the third day of the intervention, Bob made a progress by allowing the author to deliver physical prompt he needed. It brought the data to 88% accuracy, which slightly below his criterion. Despite of the fact that he required physical prompts for the first seven consecutive sessions, the maintenance data shows that Bob maintained the skills slightly below criterion levels at a mean of 83% accuracy, with a range of 77% to 88%. Most of the time, Bob failed to perform the step of rubbing hands together for 20s independently. He required verbal prompt until the last session of the intervention. The data for the three phases were stable. Moreover the percentage of overlapping data (POD) was 0% which means that all data on both intervention and maintenance session were higher than the probe sessions. There was an immediate and ideally abrupt change in the level and trend for washing hands independently in a therapeutic way

Kim. The data for all three phases for Kim can be seen in tier 2 of Figure 1. During probe sessions, Kim was performing the task of hand washing with a mean of 75% accuracy with a range of 55% to 88%. Her data points were accelerating for the first five sessions and then stabilized. These high percentages of the occurrence of the target behavior were still taken into account because Kim's main issue in this task was being consistently too

long or being too slow in performing specific steps in the hand washing procedure, which often affects the classroom daily routine. After six stable probe points were collected, including two continuous data points, intervention began. Kim's criterion was set at 100% accuracy. Kim's first datum remained the same with her probe data for she required a verbal prompt on one of the steps. Kim reached criterion in second intervention session. Her performance during intervention sessions were at a mean of 94% with a range of 88% to 100%. She did four of all seven intervention sessions independently. Her graph shows 42% of POD of probe and intervention session data. The maintenance data showed that Kim maintained the skill at 100% accuracy. In other words, even though there was not an immediate change in level and trend of the target skills on the first intervention, but she made and ideally abrupt change in the level and trend for washing hands independently in a therapeutic way in the next intervention session and maintained it throughout the maintenance sessions.

Sam. The data for all three phases for Sam can be seen in tier 3 of Figure 1. During probe sessions, Sam was performing the task of hand washing with a mean of 60% accuracy, with a range of 55% to 66%. Sam had a total of six stable probe points collected before intervention was implemented. Two of Sam's last probe data were collected consecutively. Sam's criterion was set at 100% accuracy. Sam's data had an immediate increase in level during the first intervention session. Sam reached his criterion of mastery on the third session. His performance during the intervention sessions varied from 88% to 100%. However, Sam could complete the task independently in two out of seven data points of the intervention session. His data also show 0% POD. The maintenance data shows that Sam was slightly below his criterion of mastery of 93%.

John. The data for all three phases for John can be seen in tier 4 of Figure 1. During probe sessions, John was performing the task of hand washing at 56% accuracy, with a range of 55% to 66%. John had a total of six stable probe points collected before the intervention was implemented. Two of John's last probe data were consecutively collected. John's criterion was set at 100% accuracy. John's data had an immediate increase in level during the first intervention session. John reached his criterion in two intervention sessions. His performance during the intervention sessions was 98% with a range of 88% to 100%, which was slightly below his criterion of mastery. John never required a physical prompt during the intervention sessions. He did five out of seven sessions independently. Maintenance data shows that John met his criterion of mastery of 100 %. His probe and intervention data shows 0% of POD. John was unique because he was the only participant who refused to watch short clips before watching the video modeling. He was also the only participant who communicated his preference of skipping one step of hand washing which is not essential step. He did not like the step of getting his hands wet before applying some soap. He did not like the texture of the soap on his wet hands. So it was not a skill deficit that he always jumps to the step of getting some soap without firstly having them wet. He can turn on the water tap and wet his hands when the author verbally prompted him, but he just did not like to do it. The phase line on his graph indicates the minor change created for him.

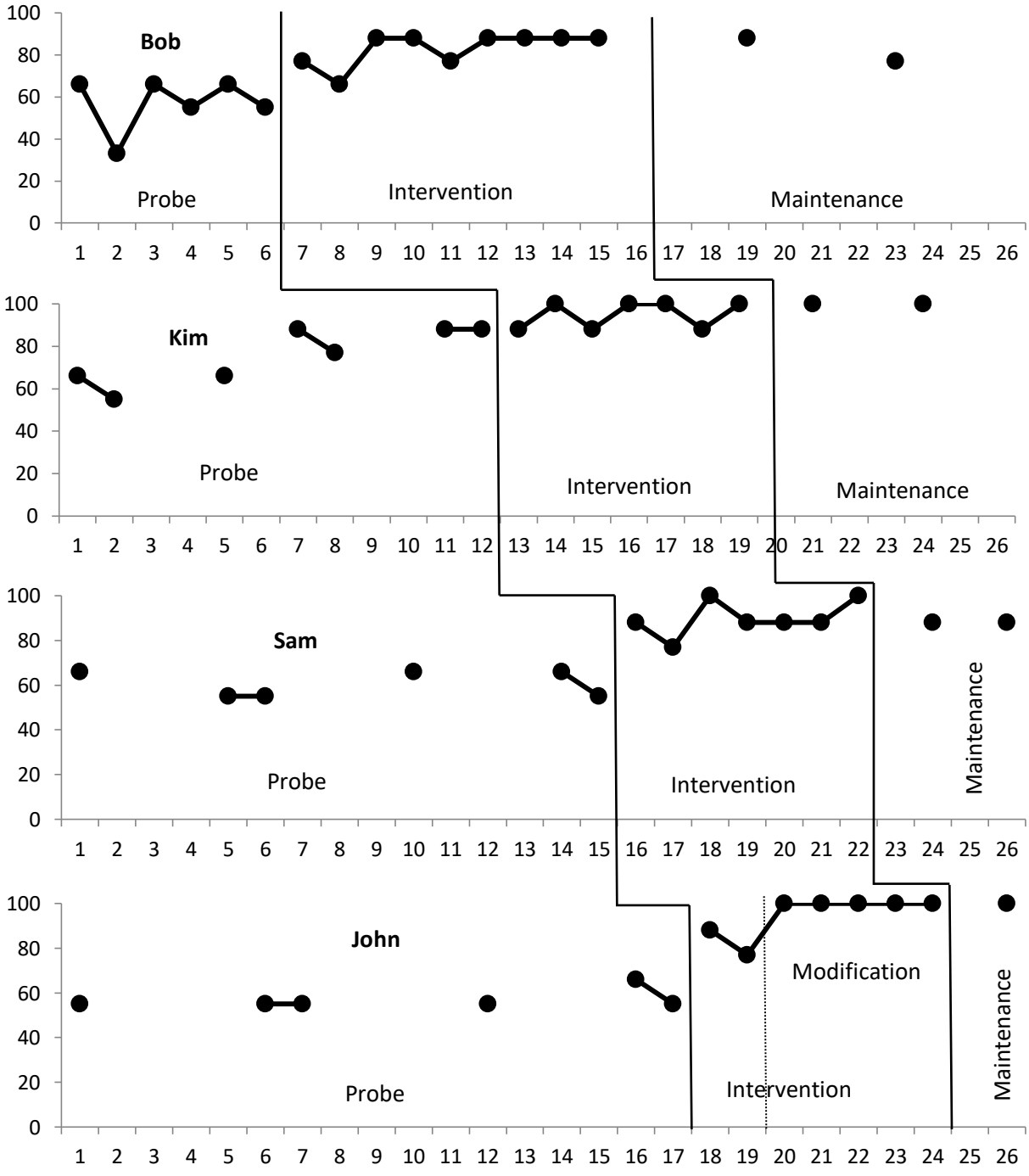

Figure 1. Percentage of correct and independent responses of washing hands of four participants with ASD

Chapter Four: Discussion

The purpose of this study was to investigate the functional relationship between the video modeling-based intervention package and the increases in level and trend for the performance of four participants with ASD in washing hands.

The data showed that there was a functional relationship between the video modeling-based intervention package and the increases in level and trend for the performance of the three participants in the study. The study showed functional relationship because the experimental control was demonstrated when each participant's performance changed when and only when the intervention was introduced (Gast, 2010). The three participants' data showed an immediate and ideally abrupt change in the dependent variable in a therapeutic direction in a tier, while data in other tiers remain stable and unchanged (Gast & Ledford, 2014). All participants also had low percentage of POD. The lower the percentage of overlap, the greater the impact the intervention has on the target behavior (Gast & Ledford, 2014). Bob, Sam and John had 0% of POD while Kim had 42% of POD. Therefore, it is confident to say that the video-modeling intervention package is effective to teach children with ASD to wash their hands independently.

Even though two of the participants could not meet their criteria of mastery, their level and trend show significant increase. Furthermore, the two participants failed to reach their criteria of 100% accuracy because they did not wait for 20s when they were rubbing their hands together after applying some soap. They waited for 10 to 15 seconds which is actually still acceptable as Ault and Griffen (2013) conducted a study involving

a 6-year-old student with retinopathy of prematurity and an intellectual disability that was unable to wash his hands independently. In the study, the author set a 5-to10-second duration for the step of rubbing hands together. In the present environment, however, licensing regulations require that students rub their hands for 20 seconds.

However, the present study contributed to the current body of research of video modeling in five ways. First, video modeling was implemented outside the natural environment of the day routines by pulling the participants out of the classroom. It strengthens the previous literature that conduct video modeling in similar ways: Nikopoulos and Keenan (2003) conducted video modeling in a residential school setting; Palechka and McDonald (2010) conducted their study in a therapy room within a school; D'Ateno et al. (2003) conducted their study at a specialized educational program; and McDonald et al. (2005) conducted their study in a special education classroom

The second reason why this study adds to literature is due to the type of video modeling technique that was used. The type of video modeling used in current research is the video with an adult as the video model. Nikopoulos and Keenan (2003), D'Ateno, et al. (2003), and MacDonald et al. (2005) used adult model videos to teach children play and social skills in their research. Palechka & McDonald (2010) used adult-video models and commercially available videos as models in their comparative study. This study is different from the current research because the adult chosen for the video modeling was particularly selected by observing to whom the children are more compliant to and/or pleased to play with. The presence of the preferred familiar adult itself could be served as an attention getter. The way the model in the video addressed the child's name also adds

to the literature for all participants showed positive response for this personal touch when their names were being called.

The third contribution of this study is that it is strengthen previous studies that used video modeling to teach different skills to children with ASD. Video modeling is most popularly associated with children who have ASD. MacDonald et al. (2005), Nikopoulos and Keenan (2003), D'Ateno et al. (2003), Bellini et al. (2007), and Palechka and MacDonald (2010) included children with autism as their primary population in their studies.

Another way this study supports the current body research is the difference of the implementer of the video modeling techniques. In the previous research, video modeling technique has been implemented by clinicians, special education teachers, and head teachers (McDonald et al., 2005; D'Ateno et al., 2003; Nikopoulos & Keenan, 2003; Palechka & McDonald, 2010). This study differed from other research because the student worker who works as classroom's assistant teacher successfully implemented the video modeling technique.

Ultimately, this study adds to the current body research the package of the intervention which combined video modeling and least-to- most prompt. Ulke-Kurkcuoglu (2015) found that both teaching methods, video modeling and least-to-most prompts, are effective for teaching pretend play skills to children with ASD. In addition, Webb (2016) discovered that video modeling was more effective to teach telling time to children with ASD when it was paired with least-to-most prompting. Meanwhile, in the current study, all participants depend on prompts delivered by the teachers when

performing correct steps of hand washing. All of the four participants show significant decrease in the need of prompting.

Limitations of the Study

While the data from the study indicated that the video-modeling intervention package is effective to teach the target skill of independent and proper hand washing, there were some limitations to the study. First, even though pulling the participants out of their natural environment to receive some part of the intervention package was claimed to strengthen the previous studies, but it also becomes the limitation of this study. Embedded teaching procedures have become a recommended practice and a commonly implemented teaching strategy in early childhood classrooms (Grisham-Brown, Schuster, Hemmeter, & Collins, 2000).

The author paired a video modeling and a least-to-most prompting instead of video prompting due to observational learning could be easily happened. The classroom environments, especially during the last few weeks of the school year tend to be less structured as it was (e.g., free play time was longer than before and the schedule was more flexible). In most of the school hours, the 18 students played in all areas in the classroom, including around the sink. If the author chose to use video prompting, which is easily embedded into the classroom routines, other participants could easily observe the intervention and master the skills before the same intervention applied to them. The second limitation is the author did not have enough time to conduct more maintenance sessions and to continue to the generalization phase to know whether the skills were generalized to another setting.

The third limitation is related to the maintenance session. The procedure of the maintenance sessions should be exactly the same with the probe session, unfortunately, in this study the author still keep one minor thing of helping the participants to count to 20 when they were performing the step of rubbing hands together with some amount of soap.

Future Research

Future research in the area of video modeling and least-to-most prompting could include examining the effectiveness of this teaching strategy on a different population of students with varying ages, abilities, and educational settings. In addition, it is also suggested that a researcher need to make sure to keep the probe and the maintenance procedures the same.

APPENDICES

APPENDIX A :Target behaviors' definition

Step	Target Behavior	Definition
1	Turns on the water tap	The child use his hand(s) to lift the water tap until some water coming out. The water can be cold or warm, it depends on the child preference
2	Wets the hands	Both palm part of the hands should be wet, at least from wrist to the fingers.
3	Takes soap	Get some amount of soap. If it is liquid hand soap, 1 drop is enough, if it is bubble soap, 1 press-amount of bubble is enough.
4	Rubs soap	Rubs the soap with both hands that the bubbles cover the palms, the back of the hand and the fingers. The length of this step should be around 20 seconds indicated by counting down number or singing Row Row Your Boat twice
5	Rinses soap out	Put both hands under the running water until all bubbles are gone.
6	Turns the water off	Use one or both hand to press down the faucet until the water stop coming out.
7	Takes the paper towel	One or both hands waves or touch the sensory part of the automatic paper towel until the paper comes out. Tears it by pulling down the paper towel slightly to the left or to the right. If the paper towel is not completely torn off, adult can help.
8	Wipes hands dry	Wipes both hand until there is no water drop from the hand
9	Trashes the paper towel	Use one or both hand to put the used paper towel into the trash bin.

APPENDIX B: Task Analysis Data Sheet

Child's name : Session : Child's performance : Hand washing						
Steps	Date					
Turns on the water tap						
Wets the hands						
Takes some soap						
Rubs soap						
Rinses the soap out						
Turns off the water tap						
Takes paper towel						
Wipes hands dry						
Trashes the paper towel						
Number of correct response (+)						
Percentage of correct response						

Notes:

APPENDIX C: Intervention Task Analysis Data Sheet

Session : Intervention

Child's name : Child's performance : Hand washing												
Steps	Date											
	O	P	O	P	O	P	O	P	O	P	O	P
Turns on the water tap												
Wets the hands												
Takes some soap												
Rubs soap												
Rinses the soap out												
Turns off the water tap												
Takes paper towel												
Wipes hands dry												
Trashes the paper towel												
Number of correct response (+)												
Percentage of correct response												

O= Occurrence (+/-) P= Performance (I: Independence VP: Verbal Prompt PP: Physical Prompt)

Notes:

Observer : _____

APPENDIX D: Procedural Fidelity

Child's Name: _____ Session :

Intervention

No	Activities	Yes	No	Note
1.	Place the data sheet near the sink.			
2.	Get the child ready to work on the intervention by saying "Hi, Brian, you will work with me practicing washing your hand in five/ten minutes, okay?" The child will respond "Okay" If not, the author will prompt them by saying: "Say, okay Miss Ndaru!" The child will respond "Okay, Miss Ndaru"			
3.	Leave the child and wait for five to 10 minutes.			
4.	Get the iPad ask the child to start working by saying "Okay, Brian, it's time to practice washing your hand, but first, let's watch the video!"			
5.	Escort the child to the area away from other participants who has not received intervention.			
6.	Place the iPad in front of the child.			
7.	Offer the child to watch a video on YouTube Kids. If she/he agrees the author will open the app.			
8.	Let the child to choose the video he/she likes.			
9.	Wait the child watch up to 2 videos for around 3 to 5 minutes.			
10.	Ask the child close the app, or help them to do so.			
11.	Open google drive app. On the iPad and ask the child to click a video prepared for her/him.			
12.	Wait the child to finish watching the video. Verbally remind them to pay attention to the screen if he/she get distracted.			
13.	After finish watching the video, ask the child to perform the task by saying "Okay, now it's your turn to wash your hands, let's go!"			
14.	Escort the child to the sink.			
15.	Wait the child to perform the task for 5 seconds before verbally prompting them to start the task.			
16.	Take the data on the child's performance.			
17.	Give verbal/physical prompts when needed: When the child forgets/skips certain step When the child takes too long to perform the task			
18.	Verbally praise the child on certain step he/she just performed and give a high five.			
Total Occurrence				
Percentage				

Observer: Date

Signature

APPENDIX E: Procedural Fidelity

Baseline Session

Child's Name: _____

No.	Steps/Activities	Yes	No	Note
1.	Prepare the data sheets			
2.	Wait the child near the sink			
3.	Watch the child washing his/her hands			
4.	Take data on the child's performance			
Total occurrence				
Percentage				

Observer Date Signature

APPENDIX F: Procedural Fidelity

Maintenance Session

Child's Name: _____

No.	Steps/Activities	Yes	No	Note
1.	Prepare the data sheets			
2.	Wait the child near the sink			
3.	Watch the child washing his/her hands			
4.	Help the child to count until 20 when it is needed			
5.	Take data on the child's performance			
Total occurrence				
Percentage				

Observer Date Signature

APPENDIX G: Inter-observer Data Sheet

Child's Name : _____

Date												
Observer	I	II	I	II	I	II	I	II	I	II	I	II
Turns on the water tap												
Wets the hands												
Takes soap												
Rubs soap												
Rinses soap out												
Turns the water off												
Takes the paper towel												
Wipes hands dry												
Trashes the paper towel												
Number of agreements												
Percentage of agreement												

Mark (+) for occurrence

Mark (-) for Non-occurrence

APPENDIX H: Parental Permission

Dear Parent/Guardian:

My name is Ndaru Prapti and I am a Master's student in Interdisciplinary Early Childhood Education at the University of Kentucky. I am conducting a research study to complete my thesis for my degree. I will be conducting research about the use of video modeling to teach young children with Autism/Developmental Delay to wash their hands independently. I would like to include your child in my research study. Your child was selected as a possible participant because he/she is identified to have a problem to wash his/her hands properly and independently. In addition, he/she is also diagnosed to have an Autism Spectrum Disorders or being referred/has the potential for being referred for an assessment of ASD. With your agreement, I will access your child's IEP to obtain detail information about them. The study will take place in his/her preschool classroom. If your child takes part in this project, it should take approximately eleven minutes per session. There will be two sessions each day for a total of five days in a week. The study will begin in the beginning of April and last until the end of the 2018 school year.

If your child takes part in this project, he will be asked to do the following activities:

- Watch short clips on YouTube Kid.
- Watch a video of a teacher performing the steps of hand washing.
- Perform the steps of hand washing independently and/or with prompt.
- Receive verbal praise from the author.

This research has a minimal risk that may occur (e.g., he is upset because I ask them to stop watching the short clips on the iPad and ask him to watch the video of targeted skills as well as being frustrated because of possible distress from the water splashes). I will not continue the intervention if he does not want to.

We do not know if your child will get any benefit from taking part in this study. However, some children have experienced an increase on the quality of hand-washing's practices. Moreover, if you take part in this study, information learned may help other children with your child's condition.

The information in this research will be kept confidential. Research data will be stored in a secure location. I will store the data on portable hard disks. It will be locked in a cabinet

at the Early Childhood Laboratory Office. The data will be made available only to the persons conducting the research. No reference will be made in oral or written reports that could link your child to the research.

Your child's participation in this project is completely voluntary. Only those children who have parental permission and who want to participate will do so, and any child may stop taking part at any time. You are free to withdraw your permission for your child's participation at any time and for any reason without penalty.

If there are any questions at any time about the study or the procedures, please contact me at 859-957-6463. You can also contact my Thesis Committee members 1) Dr. Jennifer Grisham-Brown at (859) 257-8943 or email: jennifer.grisham-brown@uky.edu, 2) Dr. Sarah Hawkins-Lear at (859) 257-9489 or email: shawkins12@uky.edu, 3) Dr. Amy D. Spriggs at (859) 257- 9105 or email: amy.spriggs@uky.edu, and my Co-Sponsor from Fayette County Public School, 4) Whitney Stevenson at (859) 629-0747 or email: whitney.stevenson@fayette.kyschools.us

In addition, if you have any questions, suggestions or concerns about your rights as a volunteer in this research, contact staff at the University of Kentucky (UK) Office of Research Integrity (ORI) between the business hours of 8am and 5pm EST, Monday-Friday at 859-257-9428 or toll free at 1-866-400-9428.

This project has been reviewed by the UK Institutional Review Board and Research Review Committee of Fayette County Public School.

Please check the applicable boxes

- ☐ I give permission to access my child's IEP
- ☐ I give permission to participate in the study

If you want your child to participate in this research project, please sign on the line below.

Parent/Guardian's Printed Name	Signature	Date
Investigator's Printed Name	Signature	Date

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